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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/675,364	09/30/2003	Norman Arnold Turnquist	127048-1	5977

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GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
PATENT DOCKET RM. BLDG. K1-4A59
NISKAYUNA, NY 12309

EXAMINER

VERDIER, CHRISTOPHER M

ART UNIT	PAPER NUMBER
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3745

DATE MAILED: 12/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/675,364

Applicant(s)

TURNQUIST ET AL.

Examiner

Christopher Verdier

Art Unit

3745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 3,11,22 23, and 25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-10,12-21 and 24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>9-30-03</u> . | 6) <input type="checkbox"/> Other: _____ |

Election/Restrictions

Applicants' election without traverse of species I, figures 1-7, in the reply filed on September 30, 2005 is acknowledged. Applicants have stated that claims 1-17 and 24 read on the elected species. Applicants are thanked for identifying these claims. The examiner notes that claims 3 and 11 do not read on the elected species, because these claims recite at least one axial displacement apparatus and axial actuators, which are not present in species of figures 1-7. Claims 18-21 also read on the elected species, although these claims were not identified by Applicants.

Claims 3, 11, 22-23, and 25 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the displacement apparatus comprising springs, inflatable tubes, rods, cams, hydraulic cylinders, piezoelectric devices, wires, cables, bi-metallic materials, phase changing materials, and solenoids (claims 4 and 13), the radial position sensors (claims 7-8, 14-15, and 19-20), the control system configured to use signals from the radial position sensors to provide feedback for active clearance control to the stator seals (claims 8, 15, and 20), the control system configured to provide discrete active clearance control to the radial blade tips and stator blade tips (claim 16), the radial position

Art Unit: 3745

sensors being eddy-current probes, photoelectric sensors, and magnetic sensors (claim 17), and the control system configured to provide discrete active clearance control to the stator seals (claim 21) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities: Appropriate correction is required.

Art Unit: 3745

In paragraph 3, last line, -- in -- should be inserted before “order”.

In paragraph 26, line 4, “a” should be deleted.

In paragraph 33, line 5, “with stator blades 16 installed” is inaccurate, because in figure 7, there are no stator blades shown.

In paragraph 34, last line, “machined” should be changed to -- machine --.

In paragraph 35, line 5, “the it” is non-idiomatic.

In paragraph 35, third to last line, “an” should be changed to -- a --.

In paragraph 36, fifth to last line, “maybe” should be changed to -- may be --.

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

Claim 16, which recites providing discrete active clearance control to the radial blade tips and stator blade tips, has no antecedent basis in the specification.

Claim 24, which recites “means for increasing blade tip clearance” and “means for restoring blade tip clearance”, has no antecedent basis in the specification.

Claim Objections

Claims 6, 12, and 19-21 are objected to because of the following informalities:
Appropriate correction is required.

In claim 6, line 2, -- which is -- should be inserted after “apparatus”.

In claim 6, line 5, -- which is -- should be inserted after “apparatus”.

Art Unit: 3745

In claim 12, line 7, -- which is -- should be inserted after “apparatus”.

In claim 12, line 10, -- which is -- should be inserted after “apparatus”.

In claim 19, line 2, -- the -- should be inserted after “of”.

In claim 20, line 2, -- the -- should be inserted after “for” (last occurrence).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4-5, and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Downer 2,279,863. Note the apparatus comprising a first stator carrier segment 15/19, with stator seals near 18 centripetally disposed thereon, a second stator carrier segment 15/19 located along a same circumference as the first stator carrier segment, and with stator seals near 18 centripetally disposed thereon, a shell 10 that adjustably houses the first stator carrier segment and the second carrier segment, displacement apparatuses 23 in operable communication with the stator carrier segments, of the first and second carrier segments, and configured to position the at least one stator carrier segment to provide active clearance control to the stator seals disposed thereon. The recitation of “for providing active clearance control between blade tips and seals in a turbomachine” in claim 1, lines 1-2 has not been given patentable weight because it occurs in the preamble of the claim. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of

Art Unit: 3745

the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). The displacement apparatus is a hydraulic cylinder. The first segment is split along a first splitline, and forms a first quad-segment and a second quad-segment, and the second segment is split along a second splitline, and forms a third quad-segment and a fourth quad-segment. The first splitline and the second splitline are perpendicular to each other.

Claims 1-2, 4-6, and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Brandon 5,810,365 (figures 1-3). Note the apparatus comprising a first stator carrier segment 13, with stator seals 14 centripetally disposed thereon, a second stator carrier segment 13 located along a same circumference as the first stator carrier segment, and with stator seals 14 centripetally disposed thereon, a shell 12 that adjustably houses the first stator carrier segment and the second carrier segment, displacement apparatuses 16 in operable communication with the stator carrier segments, of the first and second carrier segments, and configured to position the at least one stator carrier segment to provide active clearance control to the stator seals disposed thereon. The recitation of “for providing active clearance control between blade tips and seals in a turbomachine” in claim 1, lines 1-2 has not been given patentable weight because it occurs in the preamble of the claim. The displacement apparatuses are configured to be in operable communication with the first stator carrier segment and the second stator carrier segment, and to move the first stator carrier segment and the second stator carrier segment away from each other. The displacement apparatuses are springs. The first segment is split along a

Art Unit: 3745

first splitline, and forms a first quad-segment and a second quad-segment, and the second segment is split along a second splitline, and forms a third quad-segment and a fourth quad-segment. At least one displacement apparatus 16 is in operable communication with the first quad-segment and with the second quad-segment, and is configured to move the first quad-segment and the second quad-segment radially away from each other, and at least one displacement apparatus 16 is in operable communication with the third quad-segment and with the fourth quad-segment, and is configured to move the third quad-segment and the fourth quad-segment radially away from each other. The first splitline and the second splitline are perpendicular to each other.

Claims 1-2, 4, 10, 13, 18, and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Ciokajlo 5,104,287 (figures 9-11). Note the apparatus for providing active clearance control between blade tips and seals in a turbomachine, comprising a first stator carrier segment 120A, with stator seals 78A centripetally disposed thereon, a second stator carrier segment 120A located along a same circumference as the first stator carrier segment, and with stator seals 78A centripetally disposed thereon, a shell 118 that adjustably houses the first stator carrier segment and the second carrier segment, displacement apparatuses 142/144 in operable communication with the stator carrier segments, of the first and second carrier segments, and configured to position the at least one stator carrier segment to provide active clearance control to the stator seals disposed thereon. The displacement apparatuses are configured to be in operable communication with the first stator carrier segment and the second stator carrier segment, and to move the first stator carrier segment and the second stator carrier segment away from each other.

Art Unit: 3745

The displacement apparatuses are rods. Also disclosed is a turbomachine comprising a centrally disposed rotor (not numbered, near 122 in figure 10), rows of rotating blades 76 extending radially from the rotor, and each of the rotating blades having a rotor blade tip, a shell 118 enclosing the rotor and rotating blades, at least one stator carrier 120A split along a splitline into a first segment 120A and a second segment 120A, with at least one row of stator blades 78 extending centripetally from the first segment and from the second segment, the at least one stator carrier adjustably housed within the shell and each of the stator blades having a stator blade tip, and with stator seals 78A centripetally disposed on the first segment and second segment, and at least one displacement apparatus 142/144 in operable communication with the first segment and the second segment, and the at least one displacement apparatus is configured to move the first segment and second segment radially away from each other thereby providing active clearance control to the rotor blade tips and the stator blade tips. Means for increasing blade tip clearances 142/144 and means for restoring blade tip clearances 142/144 are provided.

Claim 24 is also rejected under 35 U.S.C. 102(b) as being anticipated by Martin 5,545,007. Note the turbomachine with active clearance control, comprising means for increasing blade tip clearances 12 and means for restoring blade tip clearances 12.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 3745

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 7-8, 14-17, and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ciokajlo 5,104,287 in view of Lardellier 4,714,404. Ciokajlo (figures 9-11) discloses a turbomachine substantially as claimed as set forth above, with the control system 142/144 configured to provide discrete clearance control to the radial blade tips and stator blade tips, as well as to the stator seals, but does not disclose radial position sensors configured to monitor the radial position of the stator seals (claims 7, 14, and 19), does not disclose a control system configured to use signals from the radial position sensors to provide feedback for active clearance control to the stator seals (claims 8, 15, and 20), and does not disclose that the radial position sensors are selected from the group consisting of eddy-current probes, photoelectric sensors, and magnetic sensors (claim 17).

Lardellier (figure 1 and column 4, lines 32-35) shows an active clearance control system for a turbomachine using actuators 32 which control the clearance between stator blade segments 11 having stator blades 14 and rotor blades 16 of an unnumbered rotor. Radial position sensors are configured to monitor the radial position of the stator blades, with a control system configured to use signals from the radial position sensors to provide feedback for active clearance control of actuators, for the purpose of providing a control system that can respond to changes in operating conditions.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the clearance control system of Ciokajlo such that it includes radial position sensors configured to monitor the radial position of the stator seals, and to form the clearance control system such that it is configured to use signals from the radial position sensors to provide feedback for active clearance control to the stator seals, as taught by Lardellier, for the purpose of providing a control system that can respond to changes in operating conditions. Concerning claim 17, which recites that the radial position sensors are selected from the group consisting of eddy-current probes, photoelectric sensors, and magnetic sensors, Official Notice is taken that these are well-known types of clearance position sensors in the turbomachine art for the purpose of measuring clearance between relatively movable components of turbomachines. It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified clearance control system of Ciokajlo such that the radial position sensors are selected from the group consisting of eddy-

Art Unit: 3745

current probes, photoelectric sensors, and magnetic sensors, for the purpose of measuring clearance between relatively movable components of turbomachines.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ciokajlo 5,104,287 in view of Brandon 5,810,365. Ciokajlo discloses a turbomachine substantially as claimed as set forth above, including first and second segments 120A, 120A which are split, which have multiple displacement apparatuses 142/144 which are in operable communication with the first and second segments, but does not disclose that the first segment is split along a first splitline, and forms a first quad-segment and a second quad-segment, and the second segment is split along a second splitline, and forms a third quad-segment and a fourth quad-segment, such that at least one displacement apparatus is in operable communication with the first quad-segment and with the second quad-segment, and is configured to move the first quad-segment and the second quad-segment radially away from each other, and at least one displacement apparatus is in operable communication with the third quad-segment and with the fourth quad-segment, and is configured to move the third quad-segment and the fourth quad-segment radially away from each other.

Brandon (figures 1-3) shows an apparatus comprising a first stator carrier segment 13, with stator seals 14 centripetally disposed thereon, a second stator carrier segment 13 located along a same circumference as the first stator carrier segment, and with stator seals 14 centripetally disposed thereon, with the first segment being split along a first splitline, and forming a first quad-segment and a second quad-segment, and the second segment being split

Art Unit: 3745

along a second splitline, and forming a third quad-segment and a fourth quad-segment, with at least one displacement apparatus 16 in operable communication with the first quad-segment and with the second quad-segment, and configured to move the first quad-segment and the second quad-segment radially away from each other, and at least one displacement apparatus 16 in operable communication with the third quad-segment and with the fourth quad-segment, and configured to move the third quad-segment and the fourth quad-segment radially away from each other, for the purpose of allowing more stable positioning of the carrier segments.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the clearance control system of Ciokajlo such that the first segment is split along a first splitline, and forms a first quad-segment and a second quad-segment, and the second segment is split along a second splitline, and forms a third quad-segment and a fourth quad-segment, and such that at least one displacement apparatus is in operable communication with the first quad-segment and with the second quad-segment, and is configured to move the first quad-segment and the second quad-segment radially away from each other, and at least one displacement apparatus is in operable communication with the third quad-segment and with the fourth quad-segment, and is configured to move the third quad-segment and the fourth quad-segment radially away from each other, as taught by Brandon, for the purpose of allowing more stable positioning of the carrier segments.

Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Turnquist '400 and Ray are cited to show a first stator carrier segment with stator seals, a second stator carrier segment located along a same circumference as the first stator carrier segment, and with stator seals, and displacement apparatuses in operable communication with the stator carrier segments, of the first and second carrier segments. These references could also have been applied as they anticipate at least claim 1, but are not applied at this time to avoid multiple rejections.

Farrell is cited to show a turbomachine with active clearance control, via bimetallic elements, comprising means for increasing blade tip clearances and means for restoring blade tip clearances. This reference could also have been applied as it anticipates at least claim 24, but is not applied at this time to avoid multiple rejections.

Dinc, Turnquist 2004/0100035, and Fang are cited to show segmented stator seals with active clearance control. These references could also have been applied as they anticipate at least claim 1, but are not applied at this time to avoid multiple rejections.

Ferranti is cited to show a turbomachine with stator vane seals.

Art Unit: 3745

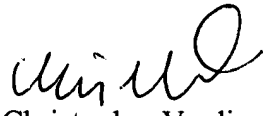
Magoshi is cited to show a segmented seal ring. This reference could also have been applied as it anticipates at least claim 24, but is not applied at this time to avoid multiple rejections.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Verdier whose telephone number is (571) 272-4824. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward K. Look can be reached on (571) 272-4820. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C.V.
December 17, 2005


Christopher Verdier
Primary Examiner
Art Unit 3745